

Claims

1. A thermal overload and resonant motion control circuit for an audio speaker driven by a drive signal from an amplifier, the circuit including:
a feedback signal generating (fsg) circuit, said feedback signal being a function of both drive
current to the speaker and speaker impedance; and
an attenuator operable in response to said feedback signal for controlling said drive signal.
2. A control circuit as claimed in claim 1 wherein said feedback signal is given by $f(ai, bv)$, where i and v are drive current and drive voltage respectively for said drive signal, and where a and b are percentages of i and v respectively utilized by said fsg circuit.
3. A control circuit as claimed in claim 2 wherein said feedback signal is proportional to the absolute value of $K(bv - ai)$ where K is a gain in said fsg circuit.
4. A control circuit as claimed in claim 3 wherein $a = b$.
5. A control circuit as claimed in claim 3 wherein said fsg circuit includes a lowpass filter having a transfer function $H(s)$, and wherein said feedback signal is given by $K(bv - ai) H(s)$.
6. A control circuit as claimed in claim 3 wherein a is approximately 0.15% to 0.5% and b is approximately 0.5%.
7. A control circuit as claimed in claim 3 including a sense resistor through which drive signal is applied to said speaker, said fsg circuit including a component for sensing the current across said sense resistor.
8. A control circuit as claimed in claim 7 wherein said component is a first differential amplifier, the output from which is (ai) , and wherein said fsg circuit includes a second differential amplifier having the said drive voltage applied thereto and generating an output which is (bv) , and a third differential amplifier having the outputs from the first and second differential amplifier as inputs and having a gain of K , said feedback signal being output from said third differential amplifier.
9. A control circuit as claimed in claim 8 wherein said third differential amplifier has a lowpass filter in a feedback loop thereof.

10. A control circuit as claimed in claim 1 wherein said attenuator includes a converter which receives said feedback signal and generates a DC output which is a selected function of the received feedback signal, and a variable impedance component through which one of the input and output of said amplifier is applied, said DC output being applied to control the impedance of said variable impedance component.

11. A control circuit as claimed in claim 8 wherein said selected function for the feedback signal is at least one of average, peak and RMS.

12. A control circuit as claimed in claim 8 wherein said variable impedance component is at least one of a compressor and a limiter.